CLAIMS

WHAT IS CLAIMED IS:

5. A method for the design and implementation of fast encoders and fast decoders for Hybrid Walsh and generalized Hybrid Walsh complex orthogonal CDMA channelization codes for multiple data rate users over a frequency band with properties

Hybrid Walsh inphase (real axis) codes and quadrature (imaginary axis) codes are defined by lexicographic reordering permutations of the Walsh code

Hybrid Walsh codes have a 1-to-1 sequency~frequency correspondence with the DFT codes and have a 1-to-1 even~cosine and odd~sine correspondences with the DFT codes

Hybrid Walsh codes take values {1+j, -1+j, -1-j, 1-j} or equivalently take values {1, j, -1, -j} with a (-45) rotation of axes and a renormalization

generalized Hybrid Walsh codes can be constructed for a wide range of code lengths by combining Hybrid Walsh with DFT (discrete Fourier transform), Hadamard and other orthogonal codes, and quasi-orthogonal PN codes using tensor product, direct product, and functional combining

algorithms are defined to map multiple data rate user data symbols onto the code input data symbol vector for fast encoding and the inverses of these algorithms are defined for recovery of the data symbols with fast decoding

encoders perform complex multiply encoding of complex data to replace the current Walsh real multiply encoding of inphase and quadrature data

decoders perform complex conjugate transpose multiply decoding of complex data to replace the current Walsh real multiply decoding of inphase and quadrature data

6. A method for the design and implementation of encoders and decoders for complex orthogonal CDMA and generalized complex orthogonal CDMA channelization codes for multiple data rate users over a frequency band with properties

complex codes inphase (real axis) codes and quadrature (imaginary axis) codes are defined by reordering permutations of the real Walsh codes

generalized complex codes can be constructed for a wide range of code lengths by combining the complex codes with DFT (discrete Fourier transform), Hybrid Walsh, Hadamard and other orthogonal codes, and quasi-orthogonal PN codes using tensor product, direct product, and functional combining

fast encoding and fast decoding implementation algorithms are defined

algorithms are defined to map multiple data rate user data symbols onto the code input data symbol vector for fast encoding

and the inverses of these algorithms are defined for recovery of the data symbols with fast decoding

encoders perform complex multiply encoding of complex data to replace the current Walsh real multiply encoding of inphase and quadrature data

decoders perform complex conjugate transpose multiply decoding of complex data to replace the current Walsh real multiply decoding of inphase and quadrature data